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ABSTRACT

The background, design, and results of the impact of an audiovisual-tutorial (AVT) package, Introductory Economic Theory, in introductory economics courses at the community-college level are discussed. A comparison was made of economic understanding and attitudes of 330 students from six similar colleges. One instructor at each school taught both control (lecture-discussion approach) and experimental (AVT films, tapes, worktexts) classes, covering the same content but differing in teaching method. Two forms of the Test of Understanding in College Economics (TUCE) were administered on first and last days of class. T-tests on pre- and post-TUCE scores and postcourse estimated weekly study time showed little difference between the groups. An analysis, using multiple-linear regression, showed that both groups spent equal time studying and achieved equal levels of economic understanding. Another multiple linear regression model was used on pre- and postcourse questionnaire data to investigate AVT effects on student attitudes toward economics. Few differences appear between both groups. Although the AVT approach might not be a more motivating teaching method, it might offer instructors and students an alternative to the conventional methods. (AV)

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An Alternative to the Conventional: The Audio-Visual-Tutorial Method for Teaching Introductory College Economics*

by

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Introduction

This paper describes a study which attempts to measure the influence of a commercially available audio-visual-tutorial (AVT) package, Introductory Economic Theory, on student economic understanding and attitudes at six community colleges. The first part of the study examined the impact of the AVT method in an introductory economics class in comparison to the conventional lecture discussion approach. The second part compares the lecture approach with the AVT approach in order to identify any differential influence on student attitudes towards economics.

Background

For the past fifteen years instructors at a number of large universities, four year colleges, and community colleges developed a concept and method of teaching-learning called audio-tutorial (AT). This method of instruction as the name implies involves the individualized learning of a subject with the aid of taped lectures and a programmed worktext. A learning center with flexible hours for student study would house the taped lectures, tape recorders, and provide necessary study carrels. One of the more recent changes in the AT method involved the inclusion of visuals (i.e., slides, movies or transparencies) for instructional and motivational purposes; thus changing the name of the teaching-learning method to audio-visual-tutorial (AVT).

A number of distinct advantages exist with the AVT program over the traditional lecture-discussion approach and can be summarized in the following list:

1) The study pace is under the control of the student
2) Better students are not a captive audience
3) Study conditions involve a minimum of distractions

4) Study time can be arranged to meet the demands of other campus activities, work or make-up exams

5) The program ideally accommodates students with a wide diversity of interests, backgrounds, and aptitudes

6) Contacts with instructors are meaningful and come at a time when students have a high propensity to learn

7) The instructor is free for the real business of teaching--orientation, direction, elucidation, guidance and personal contacts with individual students.

The above points represent the basic rationale for the development and implementation of an AVT program in place of the traditional lecture type class. Developers of the AT and AVT method point to improved student achievement and attitudes towards subject matter as a result of its use [1, 2, 3].

The success of the AT method in a botany class in the early 1960's at a large university, in terms of student performance and attitude improvement, led to the development of a number of AT and AVT programs in the sciences, and eventually to such diverse areas as business, pharmacy and economics. The David A. Martin package, Introductory Economic Theory, represents one of the first AVT packages for economics at the college level. Unfortunately, only a small amount of inconclusive research is available on the effectiveness of this educational method in influencing student achievement and attitudes towards economics. This paper will provide more evidence of the AVT impact in introductory economics courses at the community college level.

Design of the Study[1]

The data collected for this study were obtained from three Minnesota and three Missouri two year colleges during the spring of 1974.[2] These colleges showed overall similarity in philosophy, objectives, resources and type of student. While data were collected on 409 students, only

data on 330 were used for the study due to a lack of complete data on 79 students.

A general description of the sample indicates a number of differences. Twenty-one percent of the sample are female, while 79 percent are male. Forty-two percent of the students are freshman and 53 percent sophomores. The average age of students was 21 years, although ages did range from 17 to 46. Almost half of the students were required to take the course and showed average interest in the study of economics. Seventy percent of the students had no previous college work in economics.

Students at each of the six community colleges were randomly assigned to a control class using the traditional lecture-discussion approach or to an experimental class using the AVT approach. There were 156 control students and 174 experimental students. Despite the above mentioned background differences in the total sample, preliminary t-test investigation of the sample revealed no significant differences between the control and experimental groups.

Instructors were selected on the basis of expressed interest and teaching background. Before participating in the program, each instructor received background information about the program, attended a one-day workshop to learn about the AVT package, and become acquainted with the procedures for the study. One instructor at each school taught both the control and experimental class.

Great similarity existed in the type of introductory macroeconomics course taught at the various schools. The course can be used to fulfill general education requirements in all major subjects of study at the two year colleges involved in the study. The course has no prerequisites, although for forty-nine percent of the students the course was a requirement.

The AVT package, Introductory Economic Theory, developed by Professor David A. Martin of the State University of New York at Genesseo and distributed by McGraw-Hill Book Company was used for the experimental approach in the study. The AVT Martin package uses 35 m.m. colored slides to present visuals for the presentation, an audio-tape narrating the presentation, a worktext which includes instructional self-study aids, and requires "hardware" such as a slide projector or tape recorder.

The AVT program covers basic micro and macro economic theory in a series of five units, as follows:

Unit 1: Supply, Demand and Equilibrium Price
Unit 2: Macroeconomic Equilibrium
Unit 3: The Investment Multiplier
Unit 4: The Equalities of Saving and Investment
Unit 5: The Creation of Money

The package aims to teach students the basic definitions and concepts relating to elementary economic theory. The AVT approach also seeks to motivate students to do more learning on their own time as a starting point for an individualized instruction program.

The introductory macroeconomics course lasted either a semester for community colleges in Missouri (45 class sessions) and a quarter for colleges in Minnesota (30 class sessions). The AVT section of the course at either Minnesota schools or Missouri schools lasted for 15 class sessions, making one-half of the courses at Minnesota schools AVT related while one-third of the course at Missouri schools was AVT related. See Figure 1 for description of the experimental course.

The use of the 15 class sessions was basically similar at all the community colleges. The first session of the class was designed to describe the use of the AVT materials and teach students how to operate the equipment. Then a total of nine class sessions would replace the traditional lecture discussion classes' forty-five minute lectures on

Figure 1

Chart of AVT Section of Experimental Course

Class Sessions	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Activity	Students Free for AVT use	AVT	AVT	Class Meeting for Clarification & Addition	Current Issues	AVT	AVT	AVT	Class Meeting for Clarification & Addition	Current Issues	AVT	AVT	AVT	Class Meeting for Clarification & Addition	Current Issues
Subject	Units 2, 3, and 4										Unit 5				

certain economic concepts. Five of these nine class sessions would consist of the student use of units 2 to 4 of the AVT package to replace lectures on that economic content. Two class sessions would involve clarification of materials in the AVT units by the instructor without duplication of the AVT presentations. Two class sessions during units 2 to 4 were devoted to presentation of topics on current economic issues. The AVT units 2 to 4 were considered mutually complementary and were to be used in their proper order, although the instructors could vary the spacing of those nine class sessions to times of their choosing during the beginning and middle of the course.

The remaining five class sessions of the AVT section of the course related to the study of unit 5 on the creation of money. Three of the five sessions were devoted to the presentation of the economic content via the slides, narrated tape, and programmed text. One class session was used to clarify any of the material presented in the AVT materials and one class session involved a presentation by the instructor on a current issue relating to the creation of money. Since the content of unit five was considered different from a standard macroeconomics class, the instructors could postpone the teaching of that unit until the final part of the course.

The typical student use of the AVT materials at each college consisted of first taking a pre test on the assigned units. Following the pre test, the students worked on learning the economic concepts and definitions by following the slide/tape sequence. At certain points during the slide/tape sequence, students were instructed to stop and do the programmed exercises in the worktext. Finally, students took a post test to measure economic learning by the end of a unit. If a student did poorly on the post test, he/she was instructed to review the unit and take the test again.

The above sequence of study was done during a student's study time at his/her choosing. While no controls could be exercised on student conduct, it was assumed most students followed the above procedure at each community college in the study.

Students in the control class covered the same economic content as students in the AVT program. The major difference consisted of the method of teaching the material. The students in the control classes learned their economics via the lecture-discussion approach for the entire length of the course. Students in the experimental group had to learn at least part of the economic concepts via the AVT approach and did not have the benefit of lectures on certain economic concepts as did the control group. Also, for the AVT group, instructors were to use the extra time from not having to prepare lectures on certain concepts to preparing class sessions on topics of current interest to students and to advising students who might experience difficulty with the AVT material.

The impact of the AVT method was measured through the use of two test instruments. The study used Part I, macro, Forms A and B of the Test of Understanding in College Economics (TUCE). Students in the sample population took Form A of the test the first day of class and Form B the last day of class. Student attitudes towards economics were measured using data from a pre and post course questionnaire.

The Impact of the AVT Method on Economic Understanding

Preliminary t-tests on the pre and post TUCE scores, and post-course estimated weekly study time indicated no significant difference between the control and experimental groups.[3] A multiple linear regression equation was used to further examine the impact of the AVT approach on student economic understanding for this study. The equation consisted of eight regressors: sex (X_1), age (X_2), pre TUCE (X_3), post high school work in

economics (X_4), an elective or required course (X_5), pre course interest in economics (X_6), college attended (X_7 to X_{11}), and attendance in a control or experimental class - class type (X_{12}). The dependent variable in the regression was the post TUCE, measuring student achievement in economics at the end of the course.

The regression equation was based on the findings of previous research in economic education. The dependent variable post TUCE has been used in a number of studies designed to measure student economic understanding, [4, 5]. Six of the regressors - sex (X_1), age (X_2), pre TUCE (X_3), post high school work in economics (X_4), an elective or required course (X_5), and pre course interest in economics (X_6) were selected for inclusion in the equation on the basis of past research of introductory economics courses and on the basis of educational theory as background variables significantly influencing student learning [4, 5, 6]. In order to control for possible differences between colleges in such factors as the type of instructor, classroom facilities, or general academic differences, a dummy regressor was included in the equation (variables X_7 to X_{11}). Finally, the class type variable (X_{12}) representing the major focus of the study, was included to assess the impact of the AVT method on student economic understanding in comparison to the lecture discussion method. The results from the regression equation are presented in Table 1.

The regression indicates that only two variables significantly contribute to post course student understanding of economics. The pre TUCE variable is a significant and positive contributor to student economic achievement, a finding consistent with other research done in the field [5, 6]. The beta-coefficient for the pre TUCE indicates that .59 of one point is added to the dependent variable for each point on the pre TUCE scale. The accuracy - low variance - of this coefficient estimate assumes

lack of high correlation among regressors. The correlation matrix for the regression equation shows that all variables in the model are intercorrelated at .25 or less, which is below the R^2 of the regression.

Also, significant differences exist between all the colleges in regard to student economic achievement, (variables X_7 to X_{11}). The differences between colleges may be due to several factors such as the type of instructors, experimental design variation, or general college differences. Specific reason(s) for the college differences can not be identified in this analysis.

Variables originally thought to be important contributors to student economic achievement fail to be in this regression equation. Sex (X_1), post high school work in economics (X_4), and elective or required class (X_5) make a negative but insignificant contribution to the post TUCE, age (X_2) and pre course interest in economics (X_6) make a positive but inconsequential contribution to student economic understanding.

The major finding from this analysis concerns participation in the control or experimental class. When controlling for sex (X_1), age (X_2), prior knowledge of economics (X_3, X_4), course as an elective or requirement (X_5), prior interest in economics (X_6), and the college attended (X_7 to X_{11}), the type of class attended (X_{12}) fails to significantly influence student economic achievement. While a student in the AVT section would on average experience a gain in scores from pre TUCE to post TUCE, that gain would be .06 less than if the student were in the lecture discussion course - an insignificant difference between groups.

This finding does not support Tolles and Ginman [7], who found that students participating in a similar AVT program at a four year college achieved a significantly higher post TUCE score than students in a traditional lecture discussion class. These findings are consistent with

educational research of the AT and AVT method in other disciplines at two and four year colleges. The research showed that students in an AT or AVT course would do as well as or better, but not worse, in learning course content than students in the traditional lecture discussion classes [9].

What the findings do indicate is the ability of students in the AVT sections to learn at least some of the economic content on their own. These AVT students were still able to do as well as students in the conventional class. Students in the conventional classes received more instructor participation in the presentation of materials, while the AVT students only received a partial instructor presentation of content.

Regression Analysis of the Questionnaire Data

A multiple linear regression model was used to investigate the effects of the AVT approach on student attitudes towards economics using the pre and post course questionnaire data. The regression equation employed eight regressor variables - sex (X_1), age X_2), post TUCE (X_3), post high school economics (X_4), course as an elective or requirement (X_5), pre course interest in economics (X_6), college attended (X_7 to X_{11}), and the class type (control or experimental variable, X_{12}). The dependent variable was student response to the post course questionnaire asking for a rating of their interest in economics.

The regressors, age (X_2), post TUCE (X_3), post high school work in economics (X_4), and pre course interest in economics (X_5) were included in the equation as possible significant predictors of post course interest in economics on the basis of past research of student attitudes towards economics [4, 8]. Variables sex (X_1) and course as elective or required course (X_5) were considered important background variables possibly influencing student attitudes towards economics, although attitude studies in

economics showed these variables to be insignificant contributors to post course interest. In order to investigate possible differences between colleges or instructors a dummy variable, college attended, (X_7 to X_{11}) was included to control possible differences between the two-year colleges. Finally, the class type variable was included as the key to the study indicating the significant differences between the control and experimental groups. The results for this regression are reported in Table 2.

The regression line formed by this equation explained 27 percent of the variance in the dependent variable, a rather high R^2 for an attitude regression. Assuming independence among regressors,[4] the regression results indicate a number of significant differences between four of the regressors - age (X_2), post TUCE (X_3), pre course interest in economics (X_6) and three of the colleges attended (X_7, X_9, X_{11}) - and the dependent variable post course rating of economics. The pre interest variable (X_6) would by intuition be expected to show a high positive relation with post course interest. In fact, the pre interest variable (X_6) has a beta-coefficient of .40 indicating that each point on the pre interest scale adds an average of .40 to the post course rating. This finding is consistent with other research [4, 8].

Results also show that the higher student achievement in economics as measured by the post TUCE, the higher their rating of economics - a relationship found in research at two year colleges, but with different types of courses [4, 8]. Age (X_2) failed to be a significant contributor to the regression examining economic achievement, but age (X_2) does make a positive significant contribution to economic attitudes. Finally significant and positive differences were found between college 1 (X_7), college 3 (X_9) and college 5 (X_{11}). The reason for the higher rating of economics may be due to instructor differences or to general environment differences at the colleges. The specific reason cannot be identified in this analysis.

Table 2

Regression Results for Two Year College AVT Study
With Post-Course Interest Rating as the Dependent Variable
(N=318, 149 control students, 167 experimental students)

Independent Variables		beta-Coefficient (F statistic in parentheses)	
X_1	Sex (0, 1) 1 = male, 0 = female	.16	(4.30)
X_2	Age (17-46)	.01	(3.67)*
X_3	Post-TUCE (0-33)	.04	(25.70)**
X_4	Post high economics, (0, 1) 1 = yes, 0 = no	.07	(.45)
X_5	Elective or required class (0, 1) 1 = required, 9 = elective	.00	(.04)
X_6	Pre interest in economics (1-5) 1 = very low	.40	(47.15)**
X_7	College 1	.51	(8.23)**
X_8	College 2	.21	(1.75)
X_9	College 3	.39	(4.62)**
X_{10}	College 4	.02	(.01)
X_{11}	College 5	.42	(5.59)**
X_{12}	Class type (0, 1) 1 = experimental, 0 = control	.01	(.03)
Constant		.32	
Standard Error of Estimate		.72	
Adjusted R^2		.27	
Total Equation F Ratio		9.60**	

* Significant at the .05 level
** Significant at the .01 level

On the other hand, when controlling for sex (X_1), age (X_2), post TUCE (X_3), post high school work in economics (X_4), an elected or required course (X_5), pre course interest in economics (X_6) and college attended (X_7 to X_{11}), results indicate no important difference between control and experimental groups on the basis of post course rating of economics. This finding corresponds to research in other disciplines of the AT and AVT method. Most studies show either:

(1) a strong positive response to subject matter after participating in an AVT course, or

(2) no change in attitudes toward subject matter [9].

No studies showed negative attitudes toward subject matter after participating in an AVT course. The increase in positive attitude reported by Tolles and Ginman at one school at the four year college level, [7], are not supported by results from six community colleges at the two year college level.

Conclusion

The use of the AVT package, Introductory Economic Theory, as incorporated in the experimental design of this study, appears to have no significant influence on student achievement in economic understanding when compared to student achievement in a conventional lecture-discussion introductory economics course. Both groups spent the same amount of time studying for the macroeconomic principles and achieved the same level of economic understanding. The AVT Martin package is, however, well designed so that students can learn at least some of the economic concepts as well as students in the traditional course.

No statistically significant differences appear in student attitudes towards economics between students in the AVT course and students in the traditional course when controlling for a number of background variables. The AVT approach does not appear to be a more motivating teaching method.

But students appear to enjoy economics taught via the AVT approach as well as the conventional lecture-discussion approach.

The AVT method may offer economic instructors and students an alternative to the conventional without concern over a drop in student achievement or attitudes towards economics. The benefits associated with the inclusion of more choice by students and economics teachers over selection of an instructional process may add further evidence of the value of the AVT method.

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Footnotes

1. The study design, material usage, course design and data collection were done by Dr. William Becker and Michael Salemi of the Center for Economic Education, University of Minnesota.

2. Six community colleges were involved in the study. The Minnesota Colleges participating in the study were: (1) Austin Community College, Austin, MN; (2) Inver Hills Community College, Inver Grove Heights, MN; (3) Anoka-Ramsey Community College, Coon Rapids, MN. The Missouri colleges participating in the study were: (4) Longview Community College, Lee's Summit, MO; (5) Meramec Community College, Kirkwood, MO; (6) Jefferson Community College, Hillsboro, MO.

3. The mean pre TUCE score was 12.22 for the control and 12.30 for experimental. Mean post score was 16.33 for the control and experimental. The mean post course estimated weekly study time was 6.47 hours for the control and 6.59 for the experimental.

4. The correlation matrix of all variables in the model shows intercorrelations of .25 or less between variables.